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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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(54) Title: METHOD AND APPARATUS FOR DISPLAYING 3-D STATE INDICATORS

(57) Abstract: A method for presenting a user selected status of an object in a three dimensional graphic display is disclosed. The method includes the step of receiving a request to select a property of an object for display. The method further includes the step of displaying at least one property which may be displayed for the object. A selection of a property is received and the value of the selected property for the object is determined. The method further includes the step of generating a status indicator based on the value of the selected property. The status indicator is then displayed relative to the object. In a preferred embodiment, the form of the status indicator is automatically determined by the system. An apparatus for implementing the method is also disclosed.

management applications typically only show 3-D images of the basic description of the objects, such as their type and inter-connectivity. Another problem is that common system management applications only show fixed properties of the managed objects.

To show the general state of the managed objects, which may include values of their properties, such as state, load, error rate, integrity, and available capacity, known systems typically use some form of visualization appropriate to the metrics of interest. For example, to show the status of the object, an indicator of its essential health, ranging from NORMAL to CRITICAL and also taking on values such as UNKNOWN, it is common to use color, where green might indicate NORMAL, red might indicate CRITICAL and gray or black indicate UNKNOWN.

In real-world displays, it is not practical to surface all the information about the managed object in this core 3-D display. Although some applications have attempted to do this by displaying textual information on planes in 3-D, such displays are harder to read than plain 2-D text because of the limited resolution of current equipment and because current systems do not have enough computational power to anti-alias text or other graphical elements in real time. If this much information is desired, using a 2-D visualization model is considered superior. The benefits of 3-D views appear to be best gained by employing 3-D metaphors.

Some systems generate 3-D bar charts, usually standing on a plane in a regular grid. However, these bar charts have many problems. Most notably, the bars appear to be standing on a totally abstract floor plane, not one that represents the real-world objects interconnected through network links. In addition, such general charting systems are based on collected statistics, and not on real-time monitoring measurements coming out of a management system.

In order to show the other very important and detailed information about the managed objects in a practical way, it is commonplace to provide some mechanism for "drilling down," thereby retrieving more detailed information about the object from an information store, using a conventional user interface. For example, in network and systems management systems, it is common to surface status in the core display but provide performance and load indicators in other displays that may be brought up from the core display.

Unfortunately, these arrangements have some disadvantages. When additional information is brought up in secondary displays, the secondary displays deviate from the normal navigation conventions of the core 3-D display. In this situation, to see the secondary data on various management objects, it is necessary to first navigate to them, then bring up

Brief Description of the Drawings

For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings in which like reference numbers indicate like features and wherein:

Figure 1 illustrates a system according to a preferred embodiment of the present system;

Figure 2 illustrates a display of the representation of a networked computer system or complex business operation according to a preferred embodiment of the present system;

Figure 3 illustrates a section of the display in Figure 2 with an additional information display according to a preferred embodiment of the present system;

Figure 4 illustrates a section of the display in Figure 2 with an additional information display and user interface according to a preferred embodiment of the present system;

Figure 5 illustrates a section of the additional information display of Figure 3 according to a preferred embodiment of the present system; and

Figure 6 illustrates a flow chart of a method according to a preferred embodiment of the present system.

Detailed Description

The various components that comprise a preferred embodiment of the disclosed network analysis system are shown in Figure 1. The system includes one or more of a visualization workstation 101, an object repository 102, one or more management applications 103, and one or more agents 104 on each such management application. The visualization workstation 101 interacts primarily with the object repository 102. It requests information from it, it sends commands to it, and it gets notification of events such as status change or object additions from it. The repository 102 in turn gets this information form the various management subsystems 103, which are fed by agents 104 on the managed systems. An important architectural consideration of the present system is that in normal operation, the visualization workstation 101 preferably interacts with the object repository 102. This minimizes network traffic, optimizes the performance of the rendering of the workstation, and minimizes the interconnectivity between the visualization workstation 101 and the multitude of management subsystems and agents existing in practical networks.

Preferably, the management system is based on some type of store, preferably the object repository 102, that holds the description of the structure of the network. This can

embodiment of the disclosed system, the indicators 310 are the actual textual names of the properties chosen. Preferably, all properties, are visualized in a standard way after being explicitly requested, so there is no need for customization of the secondary displays.

In the preferred embodiment, after a user interacts with the control panel 304, there is an immediate effect to the indicator section 302 in the display 202, without requiring any complex settings in a dialog box, a confirmation dialog, or even pressing an OK button, which would break the flow of the operation and distract the user from the information displayed.

Further, the property selection control panel 304 preferably acts as an indicator of what information is currently displayed. In the preferred embodiment, distinct indicators for the various types of information are used through bars 312, preferably a yellow-orange-red color range indicates status and shades of blue indicate load. In this way, a knowledgeable user can immediately tell, by looking at the control panel 304 in the display 202, what information is currently displayed. In the preferred embodiment, the control panel 304 shows the current indicators, such as colors or animation effects, as well as the corresponding property, identified by name. Providing both a textual description of the properties and their corresponding visual displays in control panel 304 assists a novice user who may know the meanings of the various visual displays employed by the system.

For example, as seen in Figure 5, to indicate the real time percentage load of a computer system, the additional object 302a can be a solid bar 304 that reaches up to a corresponding percentage within an empty, transparent bar. In some ways, this resembles a conventional bar chart, with the percentage scale 306 on an x axis above the bar 304, but combined with a 3-D display 202 of real-world objects that are arranged in a way that represents the real-world configuration of these managed objects.

According to a preferred embodiment of the present system, indicator 302 is made translucent. This avoids making the visualization 302 unreadable due to the large number of objects 204 and their quantitative indicators 302, such as the bars 304. The effect is that of "colored water" reaching up to a certain level in a "glass aquarium tank." The colored area that represents the actual traffic load or performance is colored fairly solidly, just translucent enough to indicate the distinction between this quantitative measure and the real-world objects, and to prevent the quantitative measures from obstructing the view of other objects. The empty part of the tank, representing capacity of the system that is currently not exploited, is almost entirely transparent, rendered just opaque enough to give an impression of a glass tank.

What is claimed is:

1. A method for presenting a status of an object in a three dimensional graphic display, comprising:
determining a value of a property associated with an object;
determining a status indicator associated with the property;
generating a status indicator representing the property associated with the object; and
displaying the status indicator relative to the object.

2. The method of claim 1, wherein the status indicator has a translucent quality.

3. The method of claim 1, wherein the status indicator has a reflective quality.

4. The method of claim 1, wherein the status indicator is depicted as a bar.

5. The method of claim 4, wherein at least one dimension of the bar represents the value of the property.

6. The method of claim 1, wherein the status indicator is depicted as a quantitative indicator.

7. The method of claim 6, wherein the quantitative indicator is a gauge.

8. A method for presenting a user selected status of an object in a three dimensional graphic display, comprising:
receiving a request to select a property of an object for display;
displaying at least one property which may be displayed for the object;
receiving a selection of a property;
determining the value of the selected property for the object;
generating a status indicator based on the value of the selected property; and
displaying the status indicator relative to the object.

9. The method of claim 8, wherein the step of generating includes automatically determining the form of the status indicator.

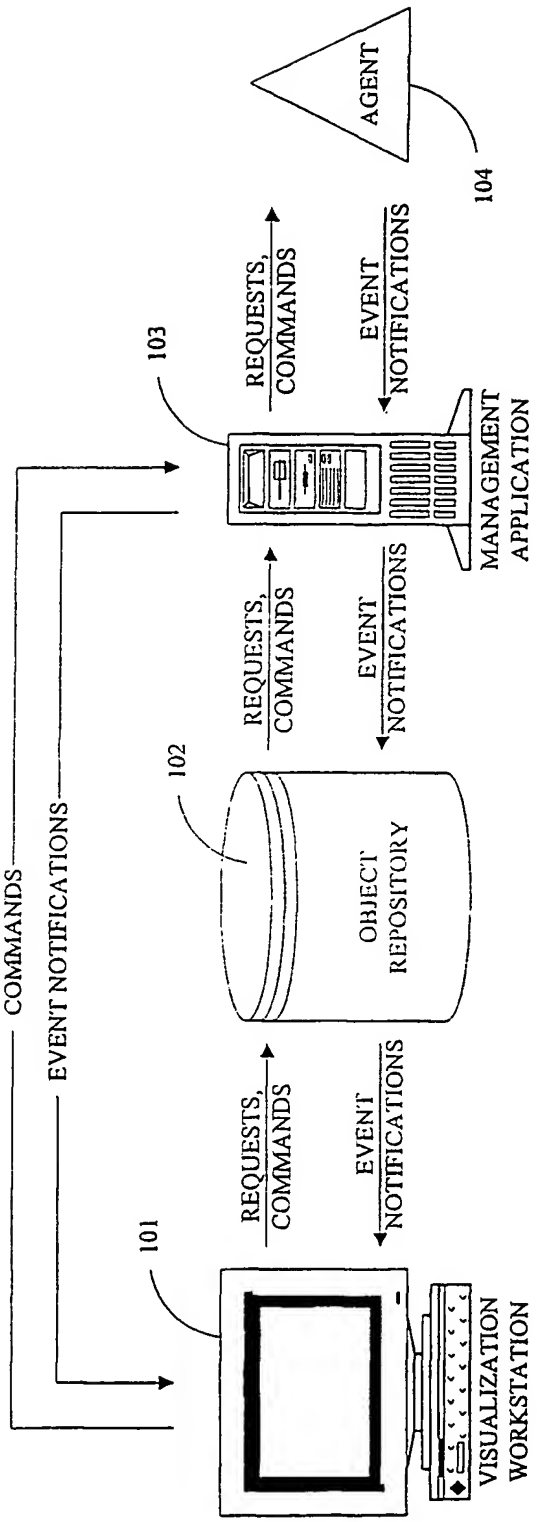

Figure 1

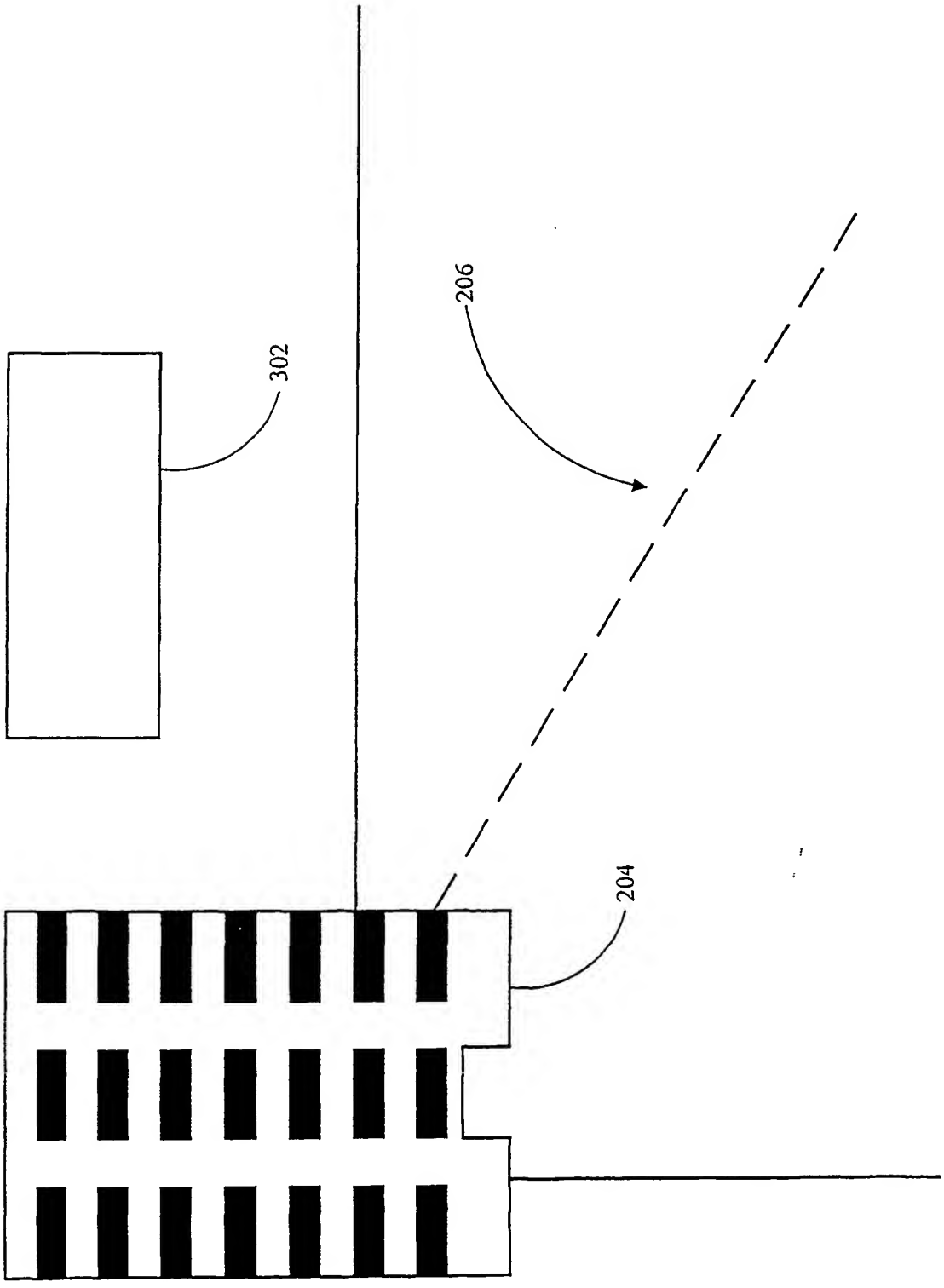

Figure 3

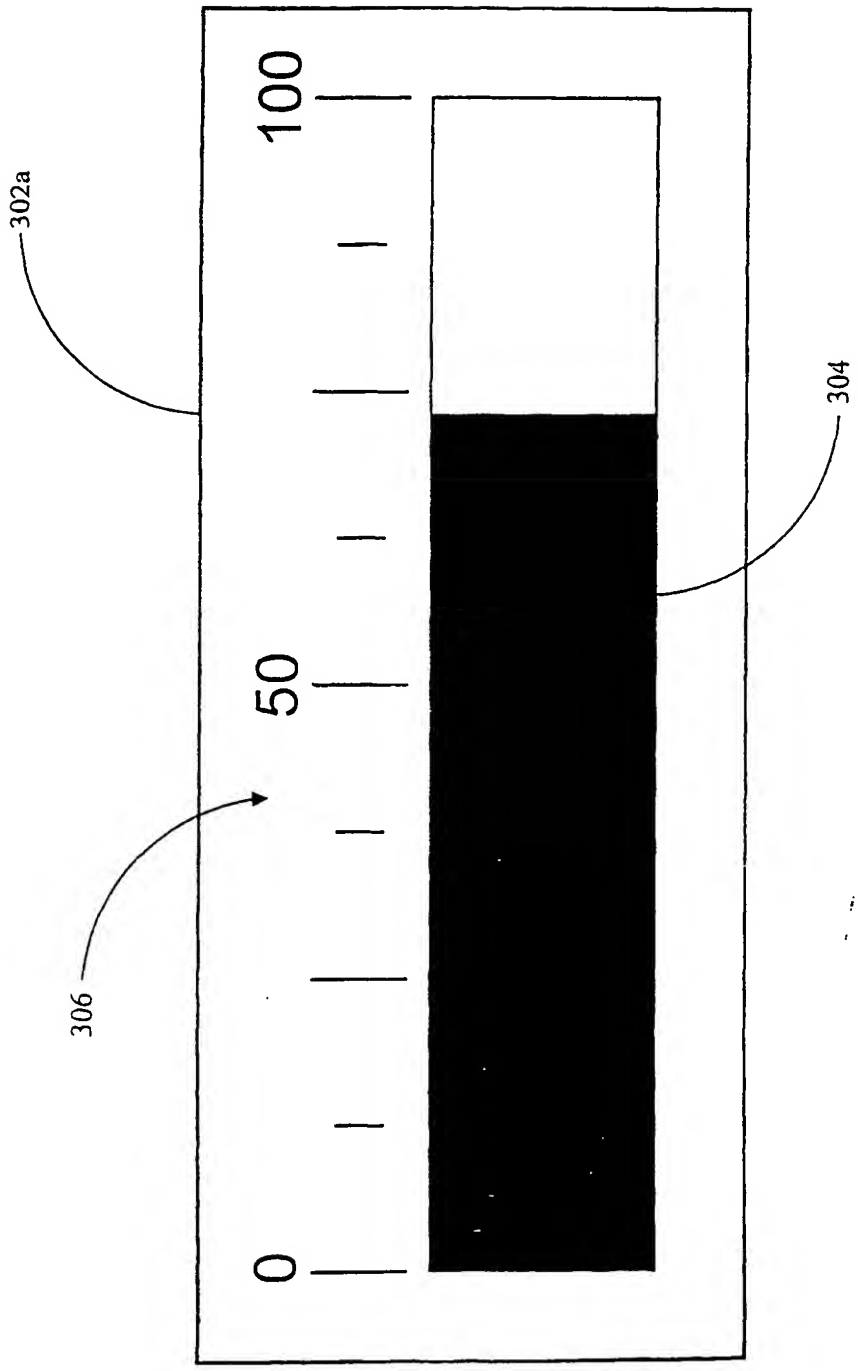

Figure 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/32489

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 15/177, 15/173

US CL : 709/220, 221, 222, 223, 224,225

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/220, 221, 222, 223, 224,225

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,958,012 A (BATTAT et al) 28 September 1999 (28.09.1999), abstract, column 4, line 46 to column 6, line 46.	1-13
Y	US 5,959,628 A (CECCHINI et al) 28 September 1999 (28.09.1999), column 2, line 41 to column 3, line 61.	1-13
Y,P	US 6,243,092 B1 (OKITA et al) 05 June 2001 (05.06.2001), column 1, line 65 to column 2, line 18.	1-13

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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